Power dissipation calculation (cont.)

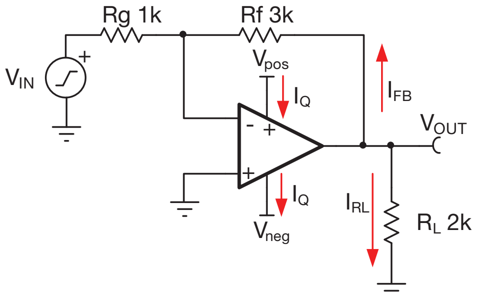

Figure 53: Current and power dissipation for inverting amplifier

Inverting amplifier power dissipation for specific V_{OUT}

$I_{RL} = \frac{V_{OUT}}{R_L}$	(143) Current through load resistor
$I_{FB} = \frac{V_{OUT}}{R_F}$	(144) Current through feedback network
$P_L = (\lvert I_{RL}\rvert + \lvert I_{FB}\rvert)(\lvert V_{sup}\rvert - \lvert V_{OUT}\rvert)$	(145) Power dissipated in op amp from load current, where $V_{sup} = V_{pos}$ if the amplifier is sourcing, or V_{neg} if the amplifier is sinking
$P_Q = (V_{pos} - V_{neg}) \bullet I_Q$	(146) Total power from quiescent current
$P_T = P_L + P_Q$	(147) Total power dissipated inside the op amp
$P_{L\_EQ} = (R_L) \parallel (R_F)$	(148) Equivalent load resistance

Inverting amplifier maximum power dissipation

$P_{dc\_max} = \frac{V_{sup}^{2}}{4 \bullet R_{L\_EQ}}$	(149) Maximum DC power dissipation inside the amplifier. Max power occurs when V_{OUT} = ½ V_{sup}. $V_{sup} = V_{pos} = \lvert V_{neg}\rvert$ for a dual symmetrical supply. $V_{sup} = V_{pos}$ for single supply configuration.
$P_{ac\_max\_avg} = \frac{2 \bullet V_{sup}^{2}}{\pi^2 \bullet R_{L\_EQ}}$	(150) Maximum AC average power dissipation for a sinusoidal signal on dual supply configuration. Max average power occurs when the V_{OUT_pk}= (2·Vcc/π). $V_{sup} = V_{pos} = V_{neg}$ for a dual symmetrical supply. For single supply max average AC power is equal to P_{dc_max}. This assumes sinewave is centered at mid-supply.
$T_j = \theta_{ja} \bullet P + T_a$	(151) Junction temperature as a function of power and ambient temperature. T_j = junction temperature. θ_{ja} = junction to ambient thermal resistance. P = P_{dc_max} or $P_{ac\_max\_avg}$ depending on your application. T_a = ambient temperature.